IMAGE

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JOURNAL OF PHOTOGRAPHY AND MOTION PICTURES
OF THE GEORGE EASTMAN HOUSE

PHOTOGRAPHY—YOUNGEST OF THE ARTS

by Howard Dearstyne

WHEN EXPOSURE METERS WERE ACTINOMETERS

by E. P. Wightman and B. Newhall

WILLIAM HENRY FOX TALBOT (1800-1877)

IMAGE

VOL. 7, NO. 1
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JOURNAL OF PHOTOGRAPHY AND MOTION PICTURES
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THE LATE ERICH STENGER

EDITORIAL

With the death of Erich Stenger on September 18, 1957, the world of photography has lost a foremost historian and collector.

At the time of his death, Dr. Stenger was in retirement in the village of Kreutzwertheim am Main, a few miles from Würzburg, Germany. Although ill and no longer the possessor of his outstanding collection – which was acquired by the Agfa Company at Leverkusen a few years ago – he still retained a deep interest in the history of photography. The last letter which we received from him contained a tribute to his friend Josef Maria Eder, the Austrian photographic scientist whose History of Photography *was the first scholarly work on the subject. Stenger's prolific writings, dating back to his 1903 doctoral dissertation, form a logical continuation of Eder's work.*

Stenger was born in Aschaffenburg, Bavaria, in 1878. Trained as a chemist in the Universities of Munich and Kiel, he joined the faculty of the Technische Hochschule in Berlin in 1905 as an assistant instructor in the photographic department. In 1934 he was named to the chair of photography founded in 1864 by Hermann Wilhelm Vogel. He remained in this post until his retirement as Professor Emeritus in 1945.

While still a student, Stenger began to collect material pertaining to the history of photography. He built up a library of more than four thousand volumes, and collected examples of all the various photographic processes. At the time of World War II, his collection was said to be the largest in private hands anywhere in the world.

His publications, which numbered more than five hundred titles, appeared largely in the German photographic press. Only the first edition of his History of Photography *has appeared in an English translation. Unfortunately this book, which was privately printed by the translator, Edward Epstean, does not contain the illustrations which Stenger carefully chose from his collection. We understand that a new translation of the second edition of this History is in preparation. It is hoped that this publication will include the illustrations.*

For Erich Stenger's memorial is his collection.

Beaumont Newhall

Photography

...YOUNGEST OF THE ARTS

by Howard Dearstyne

HOWARD DEARSTYNE, architect, teacher of architectural design in the Department of Architecture of the Illinois Institute of Technology and color photographer. This black-and-white reproduction of a color photograph consists of reflections in a puddle on a New York City pavement. It demonstrates that there is nothing which is visually insignificant and that the commonest of things may serve as components of stimulating compositions.

A PICTURE, WHETHER IT BE a photograph or a painting, is an aggregation of forms, so disposed on a two-dimensional surface as to produce an illusion of the third dimension, i. e., depth. This definition excludes from the realm of the picture most of the designs which are found, for example, in wall paper and textiles, which have little or no feeling of depth. We speak of these as patterns rather than pictures.

A second characteristic of a picture is its self-containment; it is a complete and self-sufficient visual organism in which all of the parts, like those of any living thing, perform definite functions and are necessary to the "life" of the whole. Though patterns, like the design of an oriental rug, may be self-contained, the forms composing them are usually arranged in a monotonously-repetitious manner whereas, since their disposition is not stereotyped, the forms in a picture retain a far greater degree of individuality. There can be, of course, no sharp and sure dividing line between pictures and patterns—there are no clean-cut boundaries in art—but it is useful, nevertheless, to make a distinction between them.

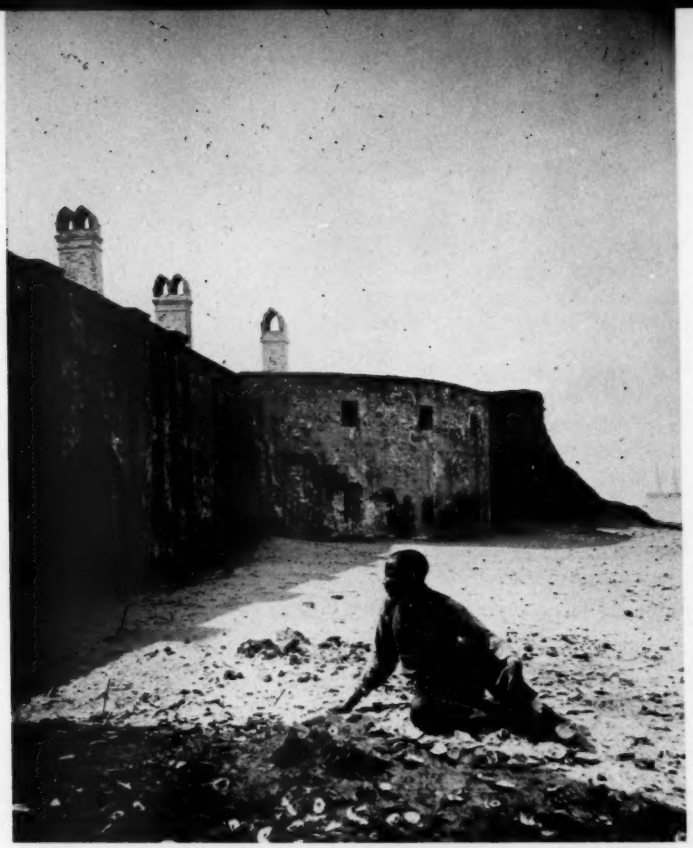
In the matter of the materials and techniques employed in the creation of pictures, we are confronted once more by the problem of deciding where to draw the line between pictorial art and certain of the other arts. Is a stone bas-relief a picture or is it sculpture? Is a Gobelin tapestry or a rug designed by Léger or Miro a woven picture or simply a textile? We are so accustomed to thinking of pictures as works executed in pigments on wood, plaster, canvas or paper that we tend arbitrarily to exclude from the category works having the distinguishing characteristics of pictures which are executed by techniques other than the customary ones.

Our reason for discussing at this length the nature of a picture and attempting to indicate the fallacy of restricting the application of this respected title to works created with pigments and the brush is to pave the way for an evaluation of the photograph. This is a visual recording made on a light-sensitive surface by a photochemical process. The more or less automatic nature of the process has led many persons to deny the photograph a place in the hierarchy of the arts. This amounts to judging the quality of a finished work on the basis of the technique which produced it rather than by the characteristics of the work itself. A work of pictorial art, these people maintain, can be made only by one or another of the time-honored manual techniques, such as those used in painting. Since each stroke of the painter's brush is dictated by an impulse from within, they declare the painting to be a product of the human spirit whereas a photograph, being as they say, merely an automatic reproduction of some external thing, bears no human impress and cannot, therefore, be classed as art.

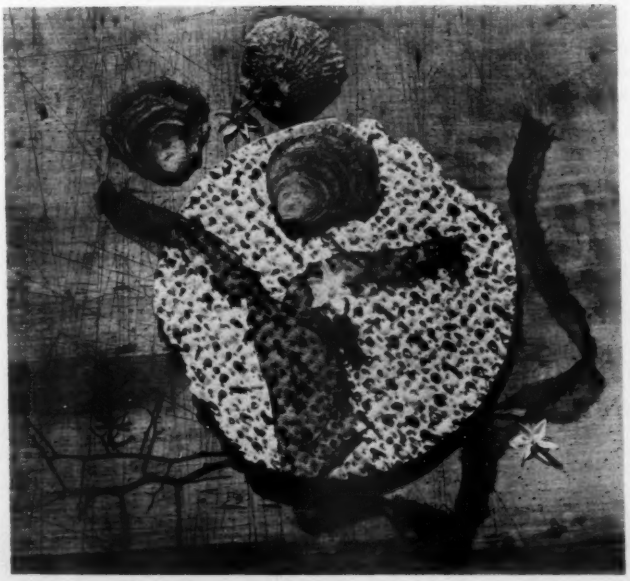
It is possible, of course, to create a photograph by arranging objects and the light which falls upon them and then recording the composition with the camera. This is the manner of working of that distinguished photographer, Walter Peterhans of the Illinois Institute of Technology in Chicago. In this case, every step in the production of the picture, except the final one of recording it, represents a subjective choice. Unless the misprizer of photography believes that some magic resides in the pigments used in painting which is absent in silver nitrate, he is bound to have to grant that a photograph made in this way is as much a human creation as any painting.

This is not, however, the usual way in which the photographer works. More characteristically he searches for his compositions in the infinitely-varied world of visual things about him and records those groupings (ready-made, so-to-speak) which arouse a response within him. In the first case, the photographer *constructs* his pictures; in this one he *discovers* them.

Though the world may be reshaped in accordance with the artist's heart's desire (the painter does this), it would be arrogance to contend that in none of its attitudes does it ever fully satisfy some inner human need. The visual impressions we receive from things about us affect us in various ways and with different degrees of intensity. By the fact of his making a choice and by the nature of the choice which the photographer makes from his vast visual repertory, he expresses his inner self as surely as does the painter who alters nature in depicting it or draws upon his inner store of visual images. The photographer's way of working might well be termed "creative selection" and it does not differ in kind from the selection made by the painter of imaginary forms which present themselves to him as candidates for recording on his canvas. In the case of each this "self-expression through selection" is more or less successful, depending



GEORGE S. COOK, pioneer American photographer and teacher of photography, who was active from the early 1840's until his death in 1902 in New Orleans, Charleston, South Carolina, New York, Philadelphia, Richmond and elsewhere. Wet plate photograph of Castle Pinckney in Charleston harbor, made during the Civil War. This impeccably composed picture with the single figure placed in perfect relationship to the archway of the fortress, has a singularly poetic quality.

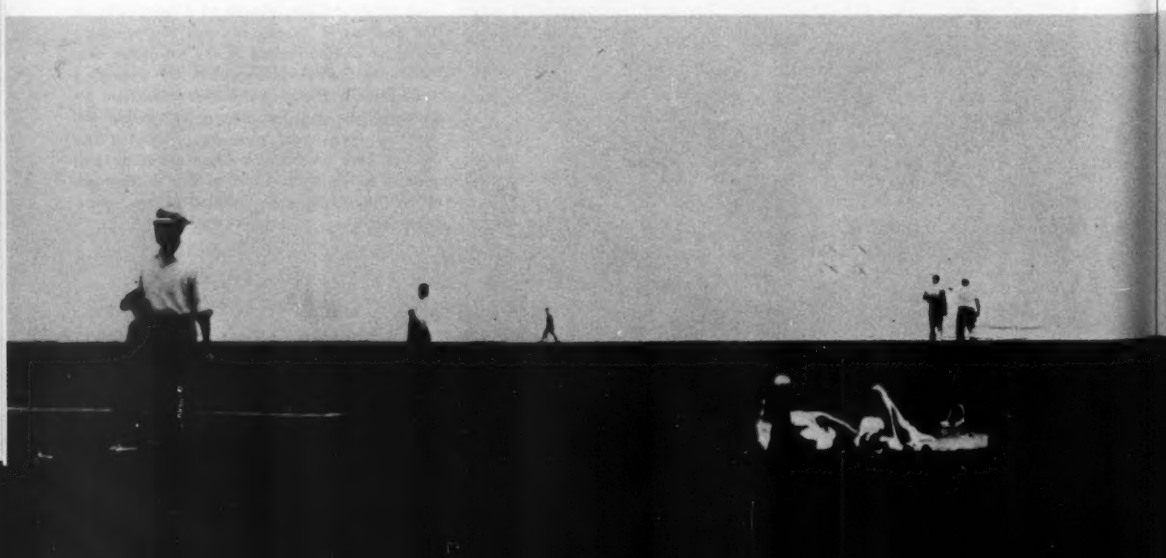


WALTER PETERHANS, teacher of visual training in the Department of Architecture of the Illinois Institute of Technology, founder and director of the Department of Photography at the Bauhaus in Dessau and one of Germany's foremost photographers in the pre-Hitler era. Peterhans creates photographs by arranging the elements of his compositions and then recording them with the camera. By relating objects of pronounced and diversified textures he has here produced a black-and-white picture as satisfying in effect as any photograph in full color. The artist entitles it "Nourriture Terrestre."

upon the degree of sensitivity and the visual insight of the artist. Both the painting and the photograph may be of little worth or of lasting significance.

Since the development of painting out of Byzantine mosaics (pictures composed of fragments of glass and stone!) pictorial art has served various functions. In the Renaissance period in Italy it was chiefly narrative, recounting in visual terms stories from the Christian religion or from Greco-Roman mythology. In the hands of the gifted Dutchmen, it came, in addition, to record scenes of daily life and views of the world round-about. In this period, as during the Italian Renaissance, portrayal of the features of specific living individuals was also important. At all times, while performing these narrative and reporting functions, paintings of lasting worth incorporated values of a fundamental nature which make them satisfying to us today, though our interest in the things depicted is, very often, slight. These basic values reside in the quality and peculiar configuration or composition of the elements—line, form, light and shade and color—of which the picture is constructed. Paintings in which the message or story is conveyed by these pictorial means, employed in a manner appropriate to the subject and capable, thanks to their character and arrangement, of furnishing aesthetic satisfaction, continue to provide enjoyment and survive. Those paintings in which a sound underlying "abstract" structure is lacking are fated to pass more or less rapidly into oblivion, except insofar as the subject matter carries useful historic or other information. Precisely the same destiny lies in store for photographs. The ones which are sound in composition will afford lasting satisfaction and endure as works of art whereas those which are not will soon be forgotten, unless, by chance, they happen to be repositories of facts of value to some later generation. But we are concerned here, not with accidental documentary values but with art, which relies, for its validity, on nothing beyond itself.

The invention of photography in 1839 was destined profoundly to affect the course of painting. Whereas painting and the related graphic arts had until that time been the chief means of reproducing the appearance of human beings and objects and the face of nature, it soon became apparent that photography could perform these functions with far greater ease and precision than painting. In addition to this, with the improvement, after the middle of the century, of the negative-positive process, the making of any desired number of copies of a photograph became a simple and inexpensive matter. The rapid spread of photography eventually, to all intents and purposes, terminated the career of painting as a method of recording the visual facts of the external world and caused it to seek other objectives. Beginning in the 1870's with the impressionists who, though they continued to paint nature, did so in a veiled and subjective way, the painters departed more and more radically from literal representation. The cubists, futurists, surrealists, expressionists and others came, in fact, deliberately to distort nature in the interest of an intensified emotional effect. Painters now no longer consider it their function to record objective facts but rather to report in pictorial terms their inner visions, the facts of their spiritual lives. So, they have arrived at abstraction, a complete or nearly complete departure from the external visual world.



HERBERT MATTER, still and motion picture photographer and creative artist of international reputation, whose talent embraces all of the fields of design. In photography Matter uses many techniques and combinations of techniques. In this multiple exposure photograph of a dancer in motion, exploiting the power of the camera to draw with light, he has achieved a rich composition in which the harmoniously-related human forms are bound together in a luminous web which seems part of their substance.

ARA IGNATIUS, architect, designer and photographer, whose fresh and original vision enables him to exploit hitherto uncharted areas of photography. The author of the article assumed this incredible photograph to be a montage until Ignatius wrote him about it as follows: "The photograph you thought was a montage is a single negative . . . It is negative I feel—an empty landscape, barren and stark —unidentifiable people in nowhere."

ROGER SHERMAN, stage designer, photographer and teacher of photography and the theatre arts at the College of William and Mary. Sherman searches for significant form in commonplace objects. The multiple reflections in the rain water on this automobile bumper, itself a reflector, have given the polished metal a reedy, striated quality somehow related in feeling to the sinewy character of a sculptured work by Donatello.

What, then, is the present state of photography? Having driven painting from the external visual world into an inner realm of fancy, has it, so-to-speak, inherited the earth only to lose its own soul? Or is the photographer, like the painter before him, able to endow his recordings of the world round-about with enduring qualities, the possession of which is essential to any work of art?

As we have already remarked, satisfying composition is a *sine qua non* of a successful and lasting work of painting or photography. The function of composition, it appears, is to make of a picture an harmonious, "living" organism, each part of which is indispensable and to which nothing can be added and from which nothing can be subtracted without destroying the delicate balance of the whole. This unity and interdependence of all of the parts of a work can be achieved in any one of an infinite number of configurations since there are and can be no fixed canons of composition. Nature does not, characteristically, present us with this humanly-cherished harmony; its visual arrangements are usually chaotic and accidental or, possibly, governed by some other-than-human law which makes them appear so. It is for this reason that men from time immemorial have altered nature in order to humanize it.

Since the photographer, because of the physio-chemical character of his technique, is chained to reality, he must seek in it those combinations of light and shade, color and form which, when recorded, yield harmonious compositions. Such potential compositions do, indeed, exist for those who are able to perceive them. The fact that they are not more frequently discovered by photographers merely means that the vast majority of those who use the camera have not trained their eyes to detect them. Those who have devoted many years to the search for these felicitous groupings of things and exceptional conditions of lighting know how slow a process this schooling of the eye can be. The very fact that success in photography is dependent upon human insight is, in itself, a proof that photography is, potentially, an art and not a mere mechanical process.

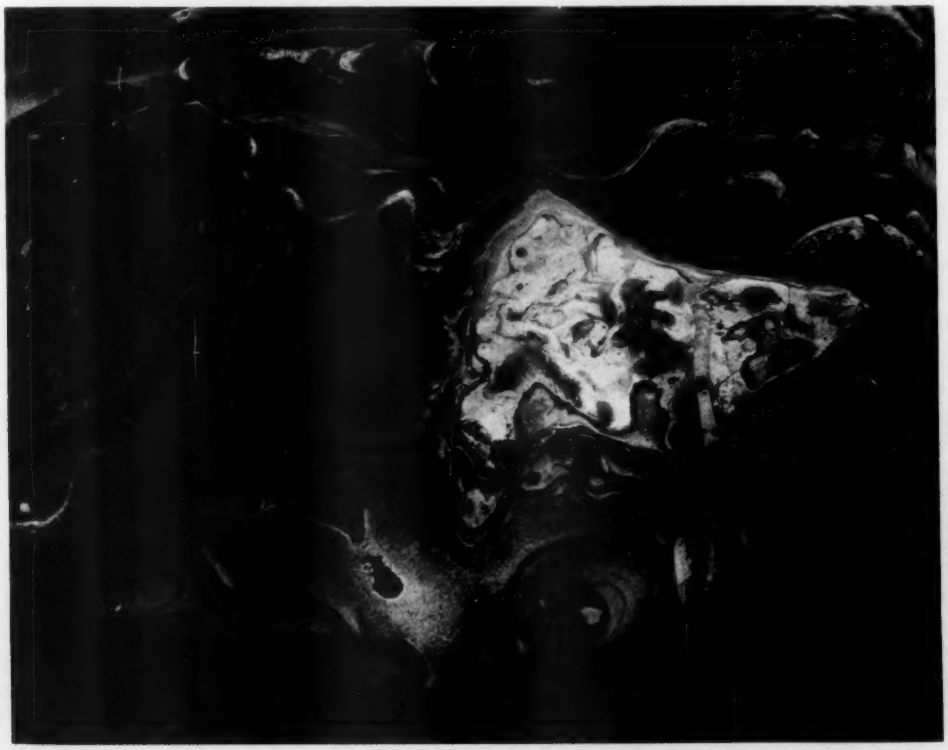
So much for composition in photography. What, then, can be said of the nature of its subject matter? The answer is simple; a photograph may be made up of anything under the sun —

"Of shoes—and ships—and sealing-wax—
Of cabbages—and Kings—"

There are no hierarchies of value—class distinctions, so-to-speak—in subject matter which make certain materials more appropriate and more instinct with meaning than certain others. The painters have long since discovered this but too

many of the photographers have not yet come to realize it. In the main they still believe that beautiful photographs can be made only from intrinsically beautiful subject matter. This misconception derives from a failure to understand the true nature of pictorial art and the role played in it by subject matter. A work of pictorial art is a complete world in microcosm, all of the parts of which function in concert with some human law. If, in the real world, an object once served nature, it now serves man and, in so doing, it becomes transmuted. In the world of the picture the first may become last and the last be first and a cabbage can rank as high as a king.

One should not be misled by what has gone before into believing that the whole secret of significant photography resides in composition. To believe this would be to ignore photography's most transcendent attributes, to divest it of its drama and its poetry. It would leave out of account its unlimited range and diversity and the capacity of each valid work of photographic art to affect us in its individual and unique way. It would also overlook the depth and intensity of feeling which photographs can arouse in us, the extent of their moving power. This depends upon the artist-photographer's ability to recognize and instantly record those fleeting moments when the subject reveals itself with unusual poignancy or when the light falling upon a group of objects is charged with that mysterious quality which seems almost to lend them tongues with which to speak. Of all the instruments of art, only the camera with its lightning-like technique can seize these transient manifestations, so laden with human import, and preserve them. It is during such moments that nature seems to discard its mask of impersonality and draw close to man but this can be perceived only with the eye of the spirit. The photographer, though he cannot, like the painter, depict his visions, can and must be guided by them in his quest of these golden apparitions.



MINOR WHITE, editor of *Aperture* and former editor of *Image*, creative photographer and champion of the art of photography. The eroded rock forms in this picture have a molten, plastic quality which is further enriched by natural patterns and textures. In addition, the character and distribution of the lights and darks produce a weird, other-worldly effect, suggesting a lunar landscape.

ACTINOMETERS

by E. P. Wightman
and
Beaumont Newhall

This is the second of a series of articles on exposure calculators, meters, and other devices for determining the optimum exposure of photographic materials, based on the outstanding collection formed by the late Joseph Bing and presented to George Eastman House in memory of her husband by Mrs. Bing. This is a condensation of a longer paper by E. P. Wightman, to be published elsewhere, with full references.

ACTINOMETERS ARE INSTRUMENTS for measuring the chemical or actinic power of light. Originally designed for purely scientific use, they were quickly adopted by photographers for calculating exposure times. Some actinometers measure light by the reaction of certain chemicals when exposed to it; others—and by far the majority—measure light by the degree of darkening of light-sensitive silver salts on paper. The first type we may call "Chemical Actinometers," and the second, "Silver Halide Actinometers."

Chemical Actinometers

In 1785 Count Claude Louis de Berthollet, a French chemist, discovered that chlorine water solution liberates oxygen gas when exposed to light. According to J. M. Eder, in his *History of Photography*, Horace Benedict de Saussure used this principle in 1790 to measure the sun's rays at high altitudes.

John W. Draper, the New York University professor who was one of America's pioneer daguerreotypists, was the first photographer to adapt such an instrument to photographic purposes. He dipped into classical mythology to name the instrument a "Tithonometer." (Tithonus: spouse of Aurora, goddess of the dawn.) "The tithonometer consists [he wrote in the Philosophical Magazine for 1843] essentially of a mixture of equal measures of chlorine and hydrogen gases. This mixture is kept in a graduated tube so arranged that the gaseous surface exposed to the rays never varies in extent, notwithstanding the contraction which may be going on in its volume, and that the muriatic acid resulting from its union is removed by absorption." (Figure 1.)

Draper later devised an instrument in which

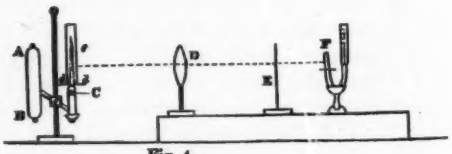


Fig. 4.

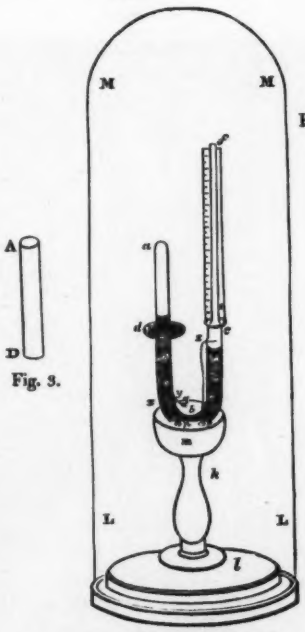


Fig. 1.

Fig. 3.

Fig. 2.

The Tithonometer.

Fig. 1 Diagram of the "Tithonometer," invented by John W. Draper. From a wood-engraving in Philosophical Magazine.

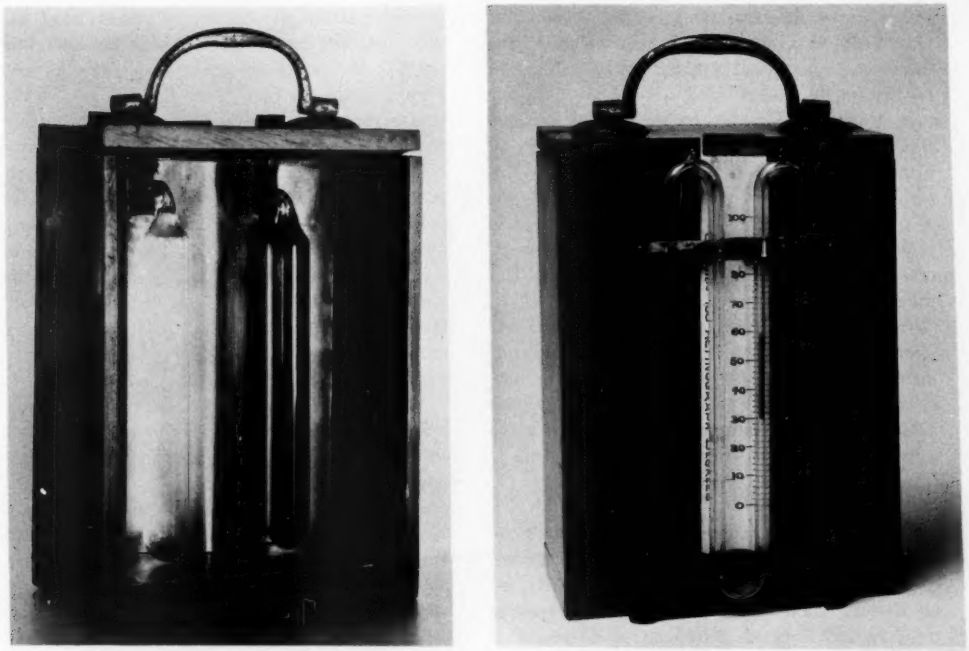


Fig. 2 Photographic reproduction of Ferdinand Hurter's "Actinometer." A—View of the differential thermometer bulbs (left). B—View of the measuring (U) tube and differential scale (right).

peroxalate of iron was decomposed by light, giving carbon dioxide gas and a precipitate of protoxalate of iron. With this improved tithonometer he proposed to take regular measurements of light in a given geographical area. "Among the important results which may be expected from these new modes of photometry," he wrote, "and which will doubtless be furnished at an early period, are the hourly, diurnal, and annual quantities of sunlight."

His prediction came true when, between 1857 and 1859, Robert William Bunsen of Heidelberg, Germany, and Henry Enfield Roscoe, of Manchester, England, published in various issues of the *Philosophical Transactions* of the Royal Society a series of papers under the title "Photochemical Researches." They had built an improved chlorine and hydrogen actinometer based on Draper's tithonometer, and proceeded to measure with considerable exactitude the intensity of sunlight and total daylight at different hours of the day, in different months of the year, and at different latitudes. The data they obtained was far more accurate and quantitative than similar data obtained by previous investigators.

The similar work of Hurter and Driffield was thus anticipated by 21 years. It must be remembered, however, that Bunsen and Roscoe were not primarily concerned with improving existing photographic technique, but were conducting a purely scientific photochemical investigation. The fact that their data was used in the calculation of exposure tables was purely incidental to their main interest.

Hurter and Driffield, on the other hand, began their classical researches because of their desire to put the practice of photography upon a sound basis. Their first step (see IMAGE, January, 1957), was to measure the intensity of light, and in 1881 Hurter patented an actinometer. While not strictly speaking chemical, it served the same purpose. It was a differential thermometer. (See Fig. 2 A and B.)

Two bulbs were made to absorb rays of various wavelengths. The difference in temperature

served as a measure of the intensity of the light. One bulb was coated with red material; the other was uncolored. Actinic light is absorbed by the red bulb, but hardly at all by the other one. A capillary U-tube containing some colored liquid was joined to the bulbs—the upper end of one side of the U-tube to the ruby bulb, the upper end of the other side to the colorless bulb. A mirror was placed behind the bulbs and a scale behind the U-tube, with a zero mark on one side and a scale of arbitrary degrees on the other.

In the dark, changes in temperature did not affect the level of the liquid. But light shining on the bulbs caused a difference in level, because more was absorbed by the red than by the white bulb. The difference in level was then measured by the scale.

Silver Halide Actinometers

Instruments which measure light by the darkening of silver salts were—like chemical actinometers—known long before photography. Eder, in his *History of Photography*, convincingly quotes from an 1820 chemical treatise by Meissner a description of an automatic, self-registering light meter. ". . . A round disk coated with chloride of silver, covered by another opaque disk which is pierced. It is covered in such a manner that the second disk is turned a little by clockwork every half hour, which exposes at each turn a new portion of the lower disk to the action of light. In sunlight, different portions undergo in this manner an unequal darkening by which the difference in intensity of the light at different hours of the day can be measured." Credit for this remarkably prophetic invention was given in the 1820 text to Count Masiglio Landrini of Vienna who died in 1818.

We next hear of an automatic actinometer from J. B. Jordan, of Falmouth, England, who presented a photographic technique for registering barometers and thermometers at a meeting of the Royal Cornwall Polytechnic Society on March 21, 1839.* Although designed to record instrument reading, Jordan found another use for his device: "The light and dark parts of the paper show the height of the mercury, and the fluctuations of the intensity of the shade represent corresponding fluctuations in the intensity of the light shining on the instrument, so that in fact it answers the double purpose, of marking the height of the barometer columns, and *noting the time of every passing cloud*. This fact gave rise to the contrivance of a new instrument which it is proposed to call the Heliograph;** its object is to yield an accurate account of the intensity of the light for every minute of the day, and permanently to register its indications." (See Fig. 3.)

When the daguerreotype process was published in August, 1839, the judging of the exposure was left to trial and error. "It is quite impossible to know the time requisite for reproduction," Daguerre wrote in his instruction manual. "It is not possible," he continued, "to announce the exact time requisite to obtain proofs; but with a little practice this can easily be calculated." Amateurs, however, found that it was not so easy. When Daguerre's manual was published in Sweden, in December, 1839, the unknown translator suggested that the plate-holder be so made that part of the plate should remain outside the camera during the exposure. The effect of light coming onto the plate through the lens could be judged by the visual appearance of the test area or by chemical treatment.

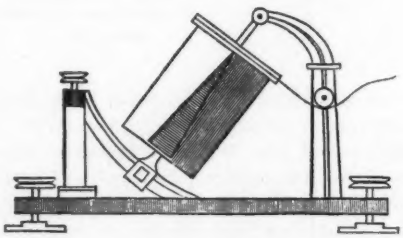


Fig. 3 Thomas B. Jordan's "Heliograph," an actinometer for self-recording the intensity of actinic or chemically active light during 24 hours of the day.

A more refined technique was proposed by K. Lewandowsky of Vienna, who in 1843 described an "Iodizing and Exposure Meter for the Daguerreotype Process." A silver plate was

*The paper is published in Sixth Annual Report of the Society, the title-page of which is dated 1838. However, Robert Hunt, who was Secretary of the Society, in his account of Jordan's experiments in his *Treatise on Photography*, clearly states that the demonstration took place in 1839. The fact that Jordan states that he followed the published description of Fox Talbot's process and makes use of the words "photographically" and "photographic" would bear out the 1839 date. Jordan's publication appeared five months prior to the description of Daguerre's process but was an application of photography to other fields than photography itself.

**Not to be confused with "Heliography," the name Niépce gave his photographic process.

Fig. 4 The Watkins' "Standard Exposure Meter," first put on the market in 1890 and advertised and sold until 1907. A combined actinometer and calculator.

exposed to the iodine fumes of the sensitizing process in longitudinal steps; it was exposed to light in the camera in lateral steps. Thus the best choice of sensitizing and exposure could be determined. This, we believe, is the first crude sensitometer. It was, according to Erich Stenger, actually put on sale.

It is obvious that, to a photographer, the mere measurement of the strength of light is only of value if it is correlated in some way with the sensitivity of his material. Reviewing various light measuring devices Antoine François Jean Claudet, the expatriate Frenchman who was Daguerre's first licensee in England, complained in 1848 that "All these several ingenious contrivances had no other object than that of measuring the photogenic intensity of the direct rays of the sun during different hours of the day." He then went on to describe his "Photographometer," which measured simultaneously the actinic intensity of the light and the sensitiveness of the photographic materials.

Shortly thereafter Roscoe—who had worked with Bunsen in the establishment of light intensity tables from measurements taken with a chemical actinometer—devised a silver halide actinometer. With it T. E. Thorpe made observations of light intensity in Pará, Brazil, while at the same time Roscoe measured the light back home at Kew, England. On comparing their data it was found that the light intensities in Brazil were considerably greater than in England. This was contrary to the observations of photographers, who found that longer exposures were needed in the tropics—a function probably not of the intensity of the light, but of the greater subject contrast of tropical scenery, in which the shadows are much denser than in northern countries. In order to get detail in photographs of them, more exposure had to be given.

In 1868 the first British patent (No. 1297) for a silver halide actinometer was granted to Louis Bing. The specifications described the general principle: "I provide a surface on which the light shall fall in such manner as to produce a graduated series of shades ranging from full light to any desired degree of obscurity, and for identifying the shades thus provided, I apply thereto a graduated figure scale. To the surface thus lighted I apply a sheet or strip of sensitive or photogenic standard paper, and obtain thereon by exposure for a determined time a graduated representation of the progressive change of tone from light to darkness." This was a kind of actinometric extinction meter.

With the advent of the gelatin dry plate in the 1880's, a great impetus was given to the

manufacture of small, portable actinometers which could easily be carried into the field by the photographer. There were two reasons why such instruments became popular for use with the new dry plates. The old collodion workers, forced as they were to produce their own sensitive material on the spot, could not expect uniformity in the sensitivity of their hand-made plates. Furthermore, since they were obliged to develop their plates immediately after exposure, they could check their results at once, and if a failure had been made in exposure, they simply washed off the collodion, resensitized the plate, and tried again. The new dry plates were manufactured under strict controls, and were reasonably uniform in their sensitivity. They were developed long after the photographer had left the spot, and errors in exposure could not be corrected.

Fig. 5 Wynne "Infallible Exposure Meter" — a combined actinometer and calculator in watch form.

The first meter to become moderately popular was that of William Ford Stanley in 1886. A few years later, in 1890, Alfred Watkins put a highly popular meter on the market. It was cylindrical. (See Fig. 4.) At one end was a brass cap, attached to the cylinder by a chain of such a length that when the cap was unscrewed and allowed to swing, each cycle was exactly half a second. The time taken for sensitized paper to darken to a standard tint was timed by this pendulum. Around the outside of the cylinder were arranged a number of rings, forming a slide rule to allow the photographer to calculate the lens stop and shutter speed for a given sensitive material. Later models of the Watkins meter were made in the form of a watch. They were marketed as late as 1931.

Somewhat similar meters were designed by G. F. Wynne: the "Infallible Exposure Meter," also in the form of a watch, had only two scales, arranged concentrically one on the glass lid and the other on the box or case. (See Fig. 5.) They, too, were very popular over many years.

Patent literature is full of ingenious variations on the actinometers described above. H. L. Ide, for example, proposed that the paper backing of roll film should have fastened to it a disk of sensitized paper surrounded by an angular border of a fixed tint and adapted to be moved to a new position. W. Derichsweiler applied for a patent to protect his invention of an actinometer coupled with a stop watch, which would stop when the test paper matched the standard tint. H. Hess went one step further: the clockwork mechanism automatically adjusted the lens aperture and shutter.

Even at best, photographic actinometers were far from precise scientific instruments. J. Sterry, in his book *Photography By Rule* listed the exposure times at $f/8$ for the identical subjects and identical plates, calculated with ten different meters: the exposure times varied from 7/8 to 6 seconds. Perhaps it was for this reason that actinometers began to lose popularity in the 1920's. More likely they fell into disfavor because the so-called "extinction meters," which measured the light optically, were quicker and more convenient to operate.

Apparently the word "actinometer" was coined by Sir John Herschel, who used it in the 1839 *Report . . . of the British Association for the Advancement of Science* to describe an intrument which he had invented. This, however, was not adapted for photographic purposes because it measured the heating power of solar radiation rather than its actinic power.

AUTHORS' NOTE: *In our article "Instruments for Measuring Exposure" in IMAGE, January, 1957, we noted that Hubert stated in 1840 that the exposure of photographic materials varies with the time of the day and month of the year, and with the latitude at which it was made. We have since found that Dominique François Jean Arago, French astronomer and physicist, in his historical* Rapport . . . sur le Daguerréotype, lu à la séance de la Chambre des Députés le 3 Juillet 1839 et à l'Académie des Sciènces séance du 19 Aôut, *preceded Hubert by about five months in this observation.*

THE COWARD'S ATONEMENT

1913. Produced in USA by 101 Bison-Universal. Directed by Francis Ford. With William Clifford, Francis Ford, Ethel Grandon, Raymond Myers. 2 reels, 35mm positive.

This Civil War drama, directed by John Ford's brother, the late Francis Ford, many years before the more noted director arrived in Hollywood, is an excellent example of the vigorous, economical and extremely effective action film which became the specialty of Francis Ford.

Fresh from Thomas H. Ince's company with its hard-hitting Indian and Military films, Ford began his Universal contract with *The Coward's Atonement.* Here he made good use of the methods he had learned under Ince. Remarked a reviewer: " . . . [The director] has closely followed Griffith and Ince in giving swift military action in the foreground with equally intense action in far reaching landscapes of great beauty and has held up to view some stirring conflicts in both large and small scope . . . "

THE BATTLE AT ELDERBUSH GULCH

1913. Produced in USA by Biograph. Directed by D. W. Griffith. With Lillian Gish, Mae Marsh, Robert Harron, Alfred Paget, Charles Mailes, Kate Bruce, Henry B. Walthall. 2 reels, 35mm positive.

The Battle at Elderbush Gulch (sometimes mistakingly called *The Battle at Elderberry Gulch* and sometimes confused with Griffith's earlier film, *The Battle)* is one of the most impressive of the Griffith Biographs. Here the director took a tragic incident from history and gave it life as only he could—developing the trifles of frontier living that, in this case, led to the massacre of a pioneer settlement by outraged Indians. Nowhere is Griffith's technique more strikingly apparent: his use of close medium shots alternated with vast long shots made to appear even longer through his placement of figures cut at the waist in the foreground while the entire frame is filled in depth with sweeping arcs of action. Partly because the cautious Biograph Company (in apparent alarm at anything more than one reel in length) temporarily shelved this and other films of Griffith, he left the organization. Griffith finally had to state his connection with *The Battle at Elderbush Gulch* through a personal advertisement. But Biograph, slow in releasing the film at first, was glad to re-issue it in 1915, after Griffith had become famous. This time, they announced that Griffith regarded it as "one of his three greatest triumphs."

ATLANTIS

1913. Produced in Denmark by Nordisk. Directed by August Blom. With Olaf Foenss, Ida Orloff, Ebba Thomsen, Frederik Jacobsen, Carl Lauritzen, Alma Hinding. 7 reels, 35mm positive.

Blom's splendid film was easily one of the most advanced and impressive motion pictures to be produced before *The Birth of A Nation.* The scenario was based on Gerhart Hauptmann's novel and the film was a great success throughout Europe. Far ahead of its time, both the length and the maturity of *Atlantis* frightened American exhibitors when it arrived in this country in 1913. Not until the latter half of 1914 was it finally shortened and re-edited for American release. The stature of this remarkable film and its possible influence on production in this country was discussed in *Image* of March 1956 in the article by James Card: *Influences of the Danish Film.*

Alfred Stieglitz, the great American photographer, once said, "If all my photographs were lost and I'd be represented by just one, The Steerage, I'd be satisfied."

He recounted the incidents of the taking of this photograph to Dorothy Norman, who published the account in Twice A Year, No. 8-9. 1942. With Mrs. Norman's kind permission, we reprint the following extracts:

THE STEERAGE

"Early in June, 1907, my small family and I sailed for Europe. My wife insisted upon going on the Kaiser Wilhelm II*—the fashionable ship of the North German Lloyd at the time. How I hated the atmosphere of the first class on that ship. I sat much in my steamer chair the first days out—sat with closed eyes. On the third day out I finally couldn't stand it any longer. I had to get away from that company. I went as far forward on deck as I could.*

"As I came to the end of the deck I stood alone, looking down. On the upper deck, looking over the railing, there was a young man with a straw hat. The shape of the hat was round. He was watching the men and women and children on the lower steerage deck. The whole scene fascinated me. I longed to escape from my surroundings and join those people.

"A round straw hat, the funnel leaning left, the stairway leaning right, the white draw-bridge with its railings made of circular chains—white suspenders crossing on the back of a man in the steerage below, round shapes of iron machinery, a mast cutting into the sky, making a triangular shape. I stood spellbound for a while, looking and looking. Could I photograph what I felt, looking and still looking? I saw a picture of shapes and underlying that the feeling I had about life. And as I was deciding, should I try to put down this seemingly new vision that held me—people, the common people, the feeling of ship and ocean and sky and the feeling of release that I was away from the mob called rich—Rembrandt came into my mind and I wondered would he have felt as I was feeling.

"Spontaneously I raced to the main stairway of the steamer, chased down to my cabin, got my Graflex, raced back again all out of breath, wondering whether the man with the straw hat had moved or not. If he had, the picture I had seen would no longer be.

"But there was the man with the straw hat. He hadn't moved. The man with the crossed white suspenders showing his back, he too, talking to a man, hadn't moved, and the woman with the child on her lap sitting on the floor, hadn't moved. Seemingly no one had changed position.

"I had but one plate holder with one unexposed plate. Would I get what I saw, what I felt? Finally I released the shutter. My heart thumping. Had I gotten my picture? I knew if I had, another milestone would have been reached, related to the milestone of my Car Horses *made in 1892, and my* Hand of Man *made in 1902, which had opened up a new era of photography, of seeing. In a sense it would go beyond them, for here would be a picture based on related shapes and on the deepest human feeling, a step in my own evolution, a spontaneous discovery."*

THE STEERAGE by Alfred Stieglitz

William Henry Fox Talbot

PHOTOGRAPH by John Moffat, Edinburgh. Carbon print. Gift of Harold White.

A wood-engraving from this photograph was published in the July 1, 1864 issue of the British Journal of Photography *as a recent portrait.*

When William Henry Fox Talbot (1800-1877), an English scientist and scholar, first learned of Daguerre's work in January, 1839, he was, as he later recollected, "plunged into a dilemma scarcely paralleled in the annals of science." For back in 1835 he had worked out a similar photographic technique.

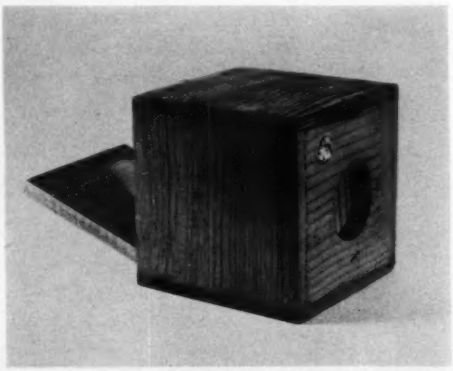
He made paper light-sensitive by soaking it first in a solution of common salt and then in a solution of silver nitrate. The paper turned dark on exposure to light. He then built a number of small cameras inside which he fastened his "photogenic drawing paper," as he named his light-sensitive material. After a long exposure—upwards of half-an-hour—a negative image was recorded by the paper. He fixed the paper by soaking it in a strong solution of common salt and with the same material made positives by contact printing.

The cameras which Talbot used in making these experiments are now preserved by the Royal Photographic Society of Great Britain and are on display in the Science Museum, London. The exact replicas of them, described below, were made for the George Eastman House in 1949 by the Kodak Society of Experimental Engineers and Craftsmen.

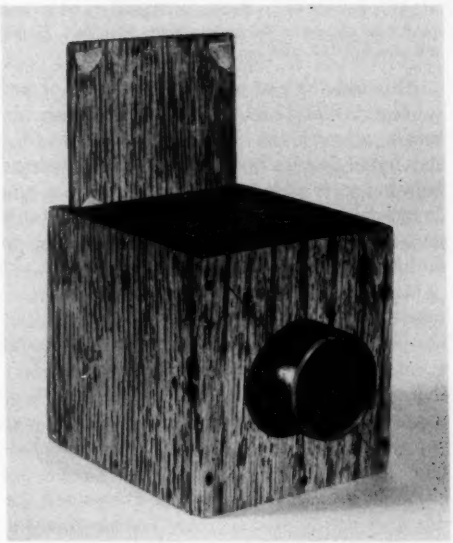
Talbot published his original technique in 1839, a few months before the French Government disclosed Daguerre's invention. Talbot continued to improve his technique. In 1840 he invented his "calotype" paper, in which a latent image was developed to a negative. When the collodion process was invented in 1851, Talbot interpreted it as a modification of his patented calotype process. He unsuccessfully brought suit against a photographer who was using the collodion process without owning a calotype license; this important lawsuit is the subject of three of the autograph letters owned by Eastman House.

Towards the end of his life Talbot made important contributions to the graphic arts. The material owned by Eastman House documenting this work will be discussed in a later installment of this Index to Resources.

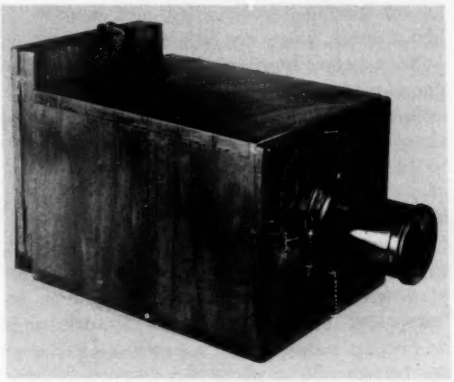
TALBOT'S CAMERAS



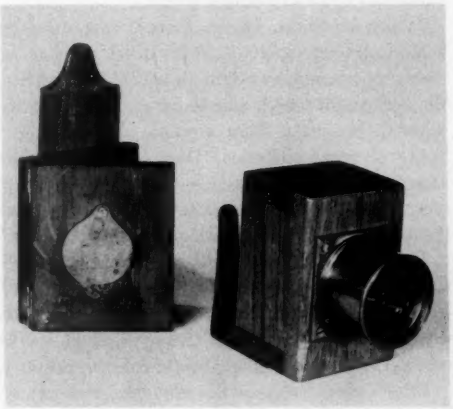
REPLICA OF BOX CAMERA, used by William Henry Fox Talbot about 1835. Wooden box, with hinged back. H. 7 cm.; W. 7.6 cm.; L. 7 cm. Lens missing. Paper was glued to inside of hinged back. Progress of formation of image observed by sighting through hole in front above lens, by unplugging cork stopper. Replica made by and gift of Kodak Society of Experimental Engineers and Craftsmen. (Neg. 4226)



REPLICA OF BOX CAMERA, used by William Henry Fox Talbot about 1835. Wooden box, with sliding back. H. 6.5 cm.; W. 6.2 cm.; L. 6.6 cm. Sensitized paper was glued to back. Brass tube inserted in front; lens missing. Replica made by, and gift of Kodak Society of Experimental Engineers and Craftsmen. (Neg. 4231)



REPLICA OF BOX CAMERA, used by William Henry Fox Talbot about 1839. Wooden box with brass brackets to attach plate holder: H. 7.5 cm.; W. 5.2 cm.; L. 4.5 cm. Lens (simulated) in tubular sliding mount, L. 2.8 cm.; Diameter, 3.8 cm. Book type plate holder, consisting of one piece of wood hinged to frame containing glass plate. Dark slide. Hole in back, covered with shutter, to permit viewing of formation of image through sensitive paper. H. 10 cm.; W. 6.3 cm.; Thickness, 1.5 cm. Replica made by and gift of Kodak Society of Experimental Engineers and Craftsmen. (Neg. 4234)



REPLICA OF BOX CAMERA, used by William Henry Fox Talbot about 1839. Wooden box with brackets to attach plate holder: H. 13 cm.; W. 14.5 cm.; L. 21 cm. Lens (simulated) in tubular sliding mount: L. 5.5 cm.; Diameter 4.7 cm. Book type plate holder, consisting of one piece of wood hinged to frame containing glass plate. Dark slide. Hole in back, covered with shutter to permit viewing of formation of image through sensitive paper. H. 14.3 cm.; W. 13 cm.; Thickness, 2.2 cm. Replica made by and gift of Kodak Society of Experimental Engineers and Craftsmen. (Neg. 4232)

AIR SPY; THE STORY OF PHOTO INTELLIGENCE IN WORLD WAR II by Constance Babington-Smith. New York, Harper & Brothers, 1957. 266 pp. Illust. $4.00.

Although the part which photography played in World War II has been legendary, an historical account has long been overdue. Miss Babington-Smith's book, written from firsthand knowledge, is welcome. Photo intelligence was so specialized and so secret in nature that only an active participant could possibly write an authentic account.

Miss Babington-Smith began photo interpretation with the Royal Air Force in the earliest days of the war, and rapidly became an expert in identifying enemy aircraft and estimating their production. Not only was she a brilliant photo interpreter but because of her expert knowledge, she also attended high-level planning meetings and was thus able to see the broad strategy of the Allied Air Forces and the practical use to which photo intelligence was put. The result is an account of one of the least known intelligence activities. Her book reads like a novel, but every fact is documented.

Even before hostilities began, British Intelligence made use of aerial photography. When ordinary methods of collecting information about Germany proved no longer possible due to the vigilance of Nazi security systems, the aid of a civilian aviator, Frederick Sidney Cotton, was enlisted. Cotton had a small color film business and found it necessary to make frequent trips to his German dealers. He flew his own plane on these business trips. Every time he "happened" to be flying over an industrial area he pressed a button and a concealed panel in the bottom of the plane slid away and three cameras began grinding out film.

When hostilities began, Cotton continued in a more official capacity. With other officers he drew up a memorandum prophesying exactly the technique which was to come: photographs were to be taken from a single place aircraft flying at great altitudes. The plane was to be unarmed, and swift enough to outdistance any enemy aircraft. At five miles altitude or more the plane would be, for all purposes, invisible.

Photographs so obtained were useless unless the information which they contained was extracted from them. Very quickly the R.A.F. worked out techniques for this specialized work which came to be called "photo interpretation."

Interpreters followed the movements of every German and Italian ship, both naval and commercial. A timetable of their movements was established with such exactness that bombers could be sent out to intercept the ships at sea. Interpreters watched the progress of submarine manufacture, from the laying of the keel to the moment before their launching, when the bombers would be dispatched. This study brought forth a prediction of the annual production of submarines.

Perhaps the most interesting of all phases of photo interpretation was Miss Babington-Smith's own specialty: the recognition of enemy aircraft, the study of their distribution, the location of airplane factories, and the estimate of their production.

When, at the end of the war, German aircraft production was dispersed in small, concealed shops in towns and villages, interpreters by a careful study of the comings and goings of motor vehicles were able to pinpoint these assembly plants. "... Often we could not say more than 'possibly' or 'probably,' but when we could establish definitely that a factory was working on jet aircraft it was promptly blotted out by the bombers, like the little Bavarian shoe factory at Wasserburg, where we found some Me 262 [jet fighters] lying about. That little factory was completely destroyed, but the manager was not killed, and when after VE-Day the allied ground-check team arrived to inspect and measure the damage, his one question was, 'How did you know?' "

The story of the discovery of launching sites for the V-1 and V-2 bombs from photographs is an account of the patient piecing together of evidence and brilliant deductive reasoning.

There was a fascination about photo interpretation which probably only those who were engaged in it can ever thoroughly appreciate. Those of us who were interpreters came to know cities and towns more intimately than if we had visited them in person. We would never be satisfied until we had explained everything that the photograph showed. Miss Babington-Smith quotes an interpreter: "I don't look for things; I let the photographs speak to me."

And that is the entire "secret" of photo interpretation. The fact that interpreters could measure ships within an error of plus or minus 10 feet, that they could estimate the speed of a ship from studying the visual pattern of its wake, that they could identify the type and calibre of

an anti-aircraft gun, was not the result of any mystic process. It was done by skillful observation, detailed comparison of photographs taken today and yesterday, and by deduction. This process, and its consequences, Miss Babington-Smith describes in her highly readable, informative and instructive book.

B. N.

ENCYCLOPEDIE PRISMA DE LA COULEUR PHOTO CINEMA. Paris, Les Editions Prisma, 1957. 250 pages, Illust.

Reviewed by W. T. Hanson, Jr., Kodak Research Laboratories.

This book was compiled under the direction of M. Déribéré, the Secretary General of the Center for Color, and L. Caillaud. The various sections were prepared by ten individuals, each well versed in the subject matter which he contributed. This type of preparation has led to a book in which the various subjects are well handled but in which the style and emphasis vary a great deal from section to section and in which there is some duplication of material. Being an "encyclopedia" the subjects are presented in alphabetical order so that related material is sometimes widely separated, but cross references (voir le mot) are numerous.

The aims of the book can best be described by quoting the preface: "... We know from experience that the photographer is inquisitive, the true amateur by definition, the professional because his knowledge must always meet the requirements exacted by daily practice.

"For both, we have endeavored to assemble in this work all the background of color photographic reproduction. The latter is examined in its scientific aspect, since from this theoretical part flow the techniques of the different processes, of the practice of taking and of printing. Likewise, a theoretical study of our vision gives knowledge of the manner in which we see the color of the subject and the way to interpret it.

"We have avoided intentionally the discussion of both motion picture and photographic exposure in general, because this subject has been discussed amply in the field of black-and-white photography. The same can be said about the material common to all processes. We have tried to cover only the color phase.

"It is no accident that this work is published on the fiftieth anniversary of the Lumiere brothers' gift to photography, the first Autochrome plate, from where, often by divergent ways, we have acquired the power of reproducing color."

The "theoretical" or tutorial treatments include sections on Colorimetry, Color, Couplers, Photomechanical Printing, Light, Masks, Photographic Objectives, Photometry, Reproduction of Color, Sensitometry, Color Vision, Printing (negatives to positives, and positives to positives), Stereo Photography, and many others. The sections on Light and on Printing are particularly thorough. A section on Quality is an excellent combination of discussions of Color Sensitometry and The Reproduction of Colors, Tone Reproduction, Definition, Edge Effects, and Graininess.

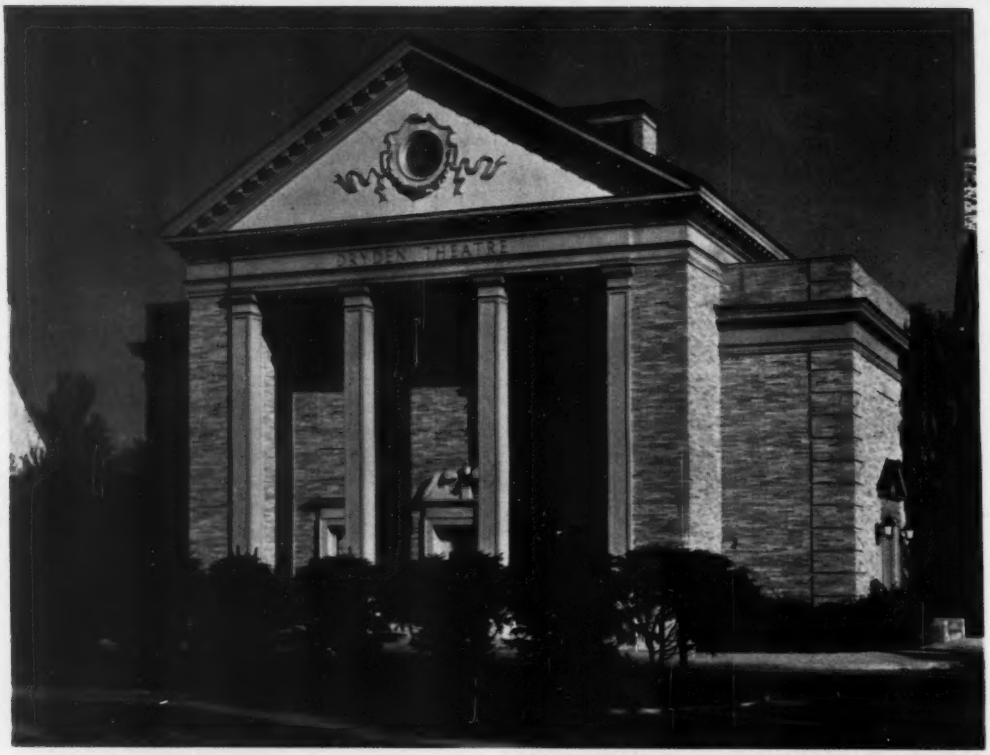
In another style of presentation are sections describing techniques for photographing Infants, Exteriors, Flowers, Fluorescence, Interiors, Medical Subjects, the Sea, Mountains, at Night, Portraits, Under Water, Stained Glass Windows, and in Caves.

Descriptions of the various color processes which have been used in the past and color photographic products which are now in use are included, although the thoroughness with which each process or product is described is not consistant from one to the other. For example, one-half a page is devoted to Technicolor, while a whole page is devoted to Supercinecolor. Tabulations of the processing steps for Agfacolor (negative-positive), Anscochrome, Ektachrome, Ektacolor, Ferrania (reversal), and Telcolor (negative-positive) are included.

In other sections dealing with the "practical" are subjects such as Cameras, Verification of Shutter Speeds, Make-up, and Projection. Filters are dealt with in a great deal of detail.

A number of beautiful color photographs are reproduced, the originals being Kodachrome, Ektachrome, Ferraniacolor, and Agfacolor. In addition, excellent color plates illustrate subtractive and additive color mixture, screen plate color process, lenticular process, a variety of subtractive processes, and photomechanical printing.

Although this book has the usual disadvantages of an encyclopedia (varying style, separation of related subject matter, and repetition) these characteristics probably add effectiveness. The French reader will probably spend more time at each sitting and will become interested in a wider variety of subjects than he anticipated. It is a real contribution to the French literature in the field of photography.



THE DRYDEN THEATRE OF THE GEORGE EASTMAN HOUSE

GEORGE EASTMAN HOUSE ASSOCIATES CALENDAR

Associates Travelogues—Dryden Theatre

January 13, at 8:30 P.M.

AROUND THE WORLD, by Leon Forgie, Pictorial Photographer from Rochester

February 10, at 8:30 P.M.

PITCAIRN ISLAND, by Luis Marden of the National Geographic Magazine

Exhibitions in the Study Room

January 1958

PHOTOGRAPHS by Jules Aarons of Boston

Exhibitions in the Dryden Gallery

January 10-March 10

HARRY CALLAHAN

An exhibition of experimental photographs by an instructor of design at the Illinois Institute of Technology

Associates Film Program—Dryden Theatre

January 18, at 8:30 P.M.

THE PRIVATE LIFE OF DON JUAN, 1934, with Douglas Fairbanks and Merle Oberon

February 15, at 8:30 P.M.

DOWN TO THE SEA IN SHIPS, 1949, with Lionel Barrymore and Richard Widmark